Postoperative Renal Dysfunction Independently Predicts Late Mortality in Patients Undergoing Aortic Reconstruction

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Objectives: Preoperative chronic kidney disease (CKD) has been shown to predict postoperative renal complications and late survival following aortic surgery, whereas the impact of postoperative renal complications less severe than permanent dialysis are unknown. We evaluated the effect of increasingly severe postoperative renal dysfunction on survival using a regional quality improvement registry.

Methods: Patients undergoing intact open aortic reconstruction in the Vascular Study Group of New England registry (2003-2012) were stratified by severity of postoperative renal complications; none, creatinine increase >0.5 mg/dL (IncCr), or any dialysis (HD). Predictors of renal dysfunction and impact of renal complications on survival were analyzed using multivariable methods.

Results: A total of 2095 patients were included, of which 72% had open abdominal aortic aneurysm repair, and 28% open aortoiliac reconstruction. Of these, 15% of patients had moderate CKD, and 1.2% had severe CKD at baseline. Postoperatuve renal complications were none in 90%, IncCr in 8.6%, and HD in 1.6%. Multivariable cumlogit regression identified moderate CKD (odds ratio [OR], 2.7; 95% confidence interval [CI], 1.8-3.9; $P < .01$), severe CKD (OR, 17; 95% CI, 7-41; $P < .01$), operating room time (OR, 1.004 minutes; 95% CI, 1.003-1.006; $P < .01$), and supra-renal clamp use (OR, 2.1; 95% CI, 1.4-2.9; $P < .01$) as independent predictors of worsening strata of postoperative renal dysfunction. Risk-adjusted multivariable Cox regression showed that IncCr (hazard ratio, 1.6; 95% CI, 1.1-2.3; $P = .01$) and HD (hazard ratio, 3.2; 95% CI, 1.8-5.7; $P < .01$) increased risk of late death independent of age, gender, baseline moderate or severe CKD, congestive heart failure, chronic obstructive pulmonary disease, and postoperative myocardial infarction or death. Five-year survival was lower (log rank $P < .01$) in patients with IncCr (71% ± 4%), and HD (29% ± 10%) compared with those with none (79% ± 1%; Fig).

Conclusions: Increasing severity of postoperative renal dysfunction independently predicts increased risk of late mortality after open aortic surgery. Perioperative measures to reduce renal complications may potentially prolong the survival of patients following open aortic surgery.

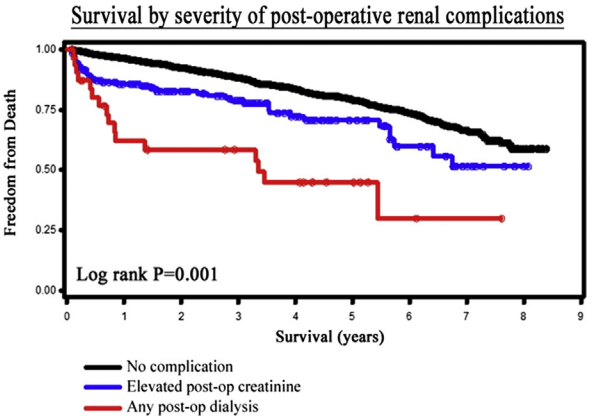

Fig.

Outcome of Carotid Endarterectomy Versus Stenting in Comparable Medical Risk Patients

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Objectives: In medically high-risk patients, the choice between carotid artery stenting (CAS) and carotid endarterectomy (CEA) can be difficult. The purpose of this study was to compare risk-stratified outcomes of CAS and CEA.

Methods: Patients undergoing primary CEA (n = 10,541) or primary CAS (n = 424) at 26 centers in the Vascular Study Group of New England were analyzed (2003-2012); patients with prior ipsilateral CEA or CAS were excluded. A medical risk score based on the risk of death within 5 years was developed for each patient using a Cox proportional hazards model. Patients in the highest risk quartile were termed high-risk (vs normal risk for the other three quartiles). Risk-stratified outcomes were compared between neurologically symptomatic and asymptomatic patients.

Results: Patients undergoing CAS had a higher prevalence of coronary artery disease, congestive heart failure, diabetes, chronic obstructive pulmonary disease, and contralateral internal carotid artery occlusion. Neurologic symptom status was not different (CAS, 43% vs CEA, 40% symptomatic). Overall 5-year survival was 80%. Medically high-risk patients had a 5-year survival of 60% and comprised 25% of CEA and 35% of CAS. Among asymptomatic patients rates of in-hospital stroke/death, and stroke/death/myocardial infarction were not different between CAS and CEA in both normal- and high-risk cohorts. Among symptomatic patients, CAS had significantly higher event rates for both normal- and high-risk cohorts (Table). CAS outcomes did not correlate with operator annualized stent volume.

Conclusions: In the Vascular Study Group of New England, asymptomatic normal- and high-risk patients do equally well after CEA or CAS. However, both normal- and high-risk symptomatic patients have substantially worse outcomes with CAS as compared with CEA. Symptom status is more important than medical risk when recommending CAS.

Table. Outcome of carotid endarterectomy vs stenting

	Stroke or death				*Stroke, death, or myocardial infarction*			
	Asymptomatic		*Symptomatic*		*Asymptomatic*		*Symptomatic*	
	Normal risk	*High risk*	*Normal risk*	*High risk*	*Normal risk*	*High risk*	*Normal risk*	*High risk*
CAS	0.0%	0.0%	4.7%	7.9%	0.0%	0.0%	6.3%	7.9%
CEA	0.6%	1.3%	1.0%	1.9%	1.4%	2.6%	1.8%	2.9%
P value	.36	.33	<.01	<.01	.15	.17	<.01	.02

CAS, Carotid artery stenting; *CEA,* carotid endarterectomy.

Racial Disparity in Hemodialysis Access Types in Patients with End-Stage Renal Disease: An Analysis of the United States Renal Database System

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Objectives: To examine racial and ethnic influences on hemodialysis initiation modes with arteriovenous fistula (AVF), arteriovenous graft (AVG), and intravenous hemodialysis (HD) catheter (IHC) in patients with end-stage renal disease (ESRD).

Methods: A retrospective analysis of a prospectively collected database comprising all ESRD patients receiving renal replacement therapy maintained by the United States Renal Database System between 2006 and 2010 was performed with institutional review board approval. χ^2 tests and analysis of variance provided descriptive statistics.

Results: Examined were 2,377,166 ESRD patients. We excluded all patients with IHC, AVF, or AVG prior to 2006, those not classified as white, black, or Hispanic, and patients with prior kidney transplants. Patients totaling 482,988 were included, of whom 82.7% initiated HD via IHC versus 13.9% via AVF and 3.4% via AVG. White patients were older (65.9 years) at initiation than black (58.4 years) and Hispanic (58.0 years) patients ($P < .001$). Black patients were more likely to be female (48.1%) than white (41.2%) and Hispanic (42.9%) patients ($P < .001$). HD initiation with AVF was more common among white patients (15.2%) than black (12.5%) or Hispanic (11.8%) patients, whereas AVG was more common among black patients (4.9%) than white (2.9%) or Hispanic (2.6%) patients ($P < .001$; Table).

Conclusions: White ESRD patients initiate HD with AVF more frequently than black or Hispanic patients. This disparity between white and black patients derives not from procedure rate, but rather from conduit selection. Black patients receive AVG two-thirds more frequently, while undergoing surgery at clinically similar rates. Hispanic patients receive fewer fistulas and grafts, as well as more catheters, in comparison to the other

study groups. Race notwithstanding, the Fistula First Breakthrough Initiative targets 50% hemodialysis initiation with fistulas, a benchmark beckoning improvement in current ESRD care.

Table. Hemodialysis initiation characteristics for ESRD patients in the United States

	White (n = 264,350)	*Black (n = 148,808)*	*Hispanic (n = 69,830)*	P *value*
Mean age (SD)	65.9 (15.3)	58.4 (15.4)	58.0 (16.6)	<.001
Female (%)	122,066 (41.2)	76,286 (48.1)	32,588 (42.9)	<.001
AVF (%)	40,206 (15.2)	18,663 (12.5)	8,221 (11.8)	<.001
AVG (%)	7,578 (2.9)	7,271 (4.9)	1,785 (2.6)	<.001
IHC (%)	216,566 (81.9)	122,874 (82.6)	59,824 (85.7)	<.001

AVF, Arteriovenous fistula; *AVG,* arteriovenous graft; *ESRD,* end-stage renal disease; *IHC,* intravenous hemodialysis.

Thioglitazones Improve SFA Stenting Primary Patency Rates in Diabetics

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Objectives: Low adiponectin levels are predictive of in-stent restenosis for bare-metal coronary stents. Thioglitazone (TZD) treatment increases adiponectin levels and decreases in-stent restenosis in coronary stents. Adiponectin is secreted by vascular smooth muscle cells (VSMCs) and adipocytes. Adiponectin promotes the quiescent phenotype of VSMCs leading to less intimal hyperplasia. We hypothesize that diabetic patients on TZDs have better superficial femoral artery (SFA) stent primary patency rates than diabetics not on TZDs.

Methods: Our institution maintains a database for SFA interventions. Patients who underwent primary SFA stenting were identified. We excluded patients undergoing concomitant tibial stenting. Student *t*-test, χ^2, and log rank were used for the statistical analysis.

Results: We identified 108 diabetic patients who had a total of 118 limbs stented between January 2000 and December 2010. Twenty patients were taking a TZD at the time of their SFA stent. Sixty-five percent of TZD patients were treated for claudication vs 42% of patients not taking TZDs ($P = .06$). Patients taking TZDs were older (mean age, 69.1 vs 63; $P = .03$). No statistically significant differences were identified for hypertension, hyperlipidemia, coronary artery disease, renal insufficiency, history of smoking, and statin use. Survival analysis showed significantly improved primary patency for patients on TZDs (Fig; $P = .04$). At 3 years, TZD primary patency was higher at 86% compared with 55% for diabetic patients not on TZDs.

Conclusions: This translational research study demonstrates the novel finding that diabetic patients on TZDs have better SFA stenting primary patency than diabetics not on TZDs. Improved primary patency leads to less reinterventions and medical cost. Future work will evaluate the usefulness of adiponectin as a biomarker and therapeutic target.

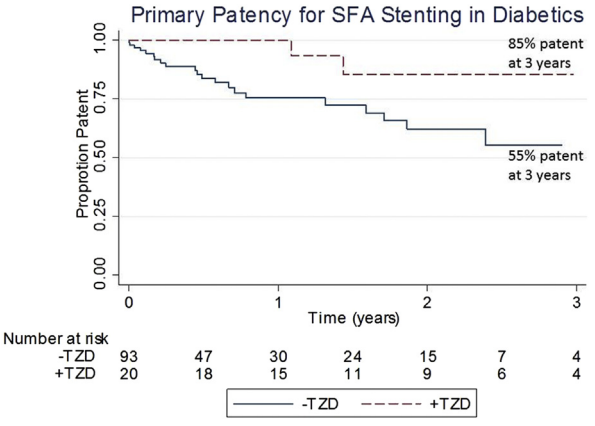

Fig.

ACE Inhibitors Improve Outcomes in Percutaneous Infrainguinal Interventions

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Objectives: The favorable effects of angiotensin-converting-enzyme (ACE) inhibitors on different aspects of cardiovascular disease and management are not well understood. We evaluated the impact of ACE inhibitors on postoperative outcomes in interventions for peripheral arterial disease (PAD) by analyzing infrainguinal endovascular procedures from December 2004 to June 2012 in patients taking ACE inhibitors (AI) and not taking ACE inhibitors (NAI).

Methods: Comparisons between AI and NAI were made using χ^2 tests and Kaplan-Meier survival curves. Multivariate regression analysis was performed using the Cox proportional hazard model.

Results: A total of 149 patients (38.3% AI, 61.7% NAI) had 316 index lesions (35.1% AI, 64.9% NAI). NAI were more likely to be female (66.7% vs 33.3%; $P = .001$) and older at time of surgery (69.6 ± 11.5 vs 74.0 ± 12.4 years old; $P = .002$). NAI were more likely to have tissue loss than AI (84.6% vs 72.3%; $P = .016$). The mean follow-up time was 25.07 months. Primary (at 18 months, 53.5% vs 47.7%; $P = .6$) and secondary patency (at 18 months, 87.3% vs 81.7%; $P = .235$) were equivocal in AI and NAI groups. There was a strong trend favoring primary assisted patency in AI (at 18 months, 84.3% vs 70.7% in NAI; $P = .053$) that did not reach statistical significance. Limb salvage was superior in AI (at 18 months, 97.8% vs 85.0% in NAI; P value $= .025$). After controlling for diabetes, hypertension, end-stage renal disease, hypercholesterolemia, coronary artery disease, TASC score, smoking status, age, and tissue loss, AI usage was an independent positive predictor of limb salvage ($P = .007$; relative risk, 0.082).

Conclusions: This data suggests that AI therapy is associated with a beneficial effect on the outcomes of percutaneous infrainquinal interventions for PAD. Further understanding of the relationship between AIs and limb salvage may help us improve the management of PAD.

Why Wait? Concurrent Venogram During First Rib Resection for Venous Thoracic Outlet Syndrome Is Safe and Efficient

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Objectives: Surgical treatment of venous thoracic outlet syndrome (VTOS) traditionally involves first rib resection (FRR) followed by interval venogram and balloon angioplasty. This approach can lead to an extended need for anticoagulation and a separate anesthesia session. We present outcomes for FRR with concurrent venogram.

Methods: Retrospective chart review was performed for consecutive patients undergoing FRR with concurrent venogram for idiopathic VTOS from 2/2007 to 2/2013. Venograms were performed immediately after FRR with the arm in neutral and provocative positions. The primary outcome was modification of procedure following venogram. Secondary outcomes were subclavian vein (SCV) patency, duration of anticoagulation, and symptom relief.

Results: Twenty-four patients underwent FRR with venogram with a mean follow-up time of 32.4 months. The mean age was 28.5 years (range, 17-52 years), and 14 (58.3%) were female. All were maintained on anticoagulation prior to the procedure. Concurrent venogram resulted in modification of the procedure in 22 patients (91.7%). Of these, 21 patients (95.4%) underwent balloon angioplasty, and one patient (4.5%) underwent further rib resection. Fifteen patients (62.5%) were discharged after the procedure with no anticoagulation. For those receiving postoperative anticoagulation for persistent minor thrombus, median time for anticoagulation duration was 5.6 months (range, 0.8-28.7 months). Two patients (8.3%) had postoperative bleeding requiring thoracentesis or video-assisted thoracoscopic evaculation of hemothorax. One patient (4.2%) suffered rethrombosis and was successfully lysed open, resulting in a 2-year SCV primary patency of 95.8% and primary-assisted patency of 100%. No patients required reoperation for VTOS and all reported improvements in symptoms. Two patients (8.3%) underwent prophylactic FRR on contralateral side for symptoms and SCV stenosis.

Conclusion: FRR with concurrent venogram is a safe procedure for VTOS that allows for effective intraoperative modification of the surgical plan, resulting in excellent SCV patency, early cessation of anticoagulation, and durable symptom relief.